

## EXTRAPLEURAL THORACOPLASTY \*

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While the treatment of tuberculosis of the lung will always be the work of the internist, there are certain cases where surgery should be the treatment of choice and from recent developments it appears that this number will be greatly increased in the near future.

Artificial pneumothorax (Forlanini-Murphy) is of great assistance in the treatment of selected types of pulmonary tuberculosis, particularly when the pulmonary and costal pleurae have not become too adherent. Where the adhesions are dense, the pleurae thickened, attempts at inflation usually fail. In a certain number of such cases surgery of the bony framework of the chest offers definite collapse and immobilization, with a chance of relief or even a cure.

It is well known that absolute rest of a tuberculous focus tends towards its resolution. To prevent mobilization of the diseased lung whose adherent pleurae preclude successful pneumothorax, different methods have been tried. As early as 1908 Friedrich of Munich devised a modification of the Schede operation which he termed "Extrapleural Thoracoplasty." This was done by means of the Schede incision and while successful as to detail, produced considerable shock and was none too well suited to the weakened individuals upon whom it was usually necessary to operate. Sauerbrück, Friedrich's assistant, modified the operation by doing it in two or more stages and under local anaesthesia. The results were better. Wilms of Heidelberg modified the operation still more by using his "columnar resection" anterior and posterior, leaving a central section of each rib to act as more effective compression and better protection to the thoracic viscera. The operation is comparatively simple and in the hands of experienced surgeons consumes but little time and is seldom followed by shock. The immediate risk to the patient is small. The fact that the attachment of the ribs and sternum is cartilagenous provides at once a readily movable and flexible articulation, so that by confining the surgery to the vertebral ends of the ribs, removing large sections which include the angle of each rib, a satisfactory collapse and immobilization of the lung may be procured. It was A. Boiffin, who first clearly demonstrated through J. Gourdet, a pupil, precisely why it is the posterior portion of the rib that must be removed. Gourdet's argument, quoted by Bull, is as follows:

"On account of the yielding rib cartilage the anterior part of a rib can be pressed inwards, while the posterior portion is stiff and, practically speaking, immovably connected with the vertebral column, and in any case can only be moved up and down a little. Further, the posterior part of a rib exhibits a marked concavity forwards, or, in other words, forms an arc the radius of which is much less than that of the arc of the rib other-

wise; the angle of the rib forms the most prominent point in this arc behind. Any resection of the ribs which is situated in front of the angle of the scapula leaves behind a stiff unyielding piece of rib, which in accordance with its length will prevent the soft parts from falling in and diminish the costo-vertebral angle. If, on the other hand, we remove the posterior stiff part of the ribs, the anterior part can very easily be turned about the costal cartilage and pressed in towards the thoracic cavity and backwards towards the posterior fragment of rib, so that the entire arc of the rib decreases considerably in its curve and thereby also decreases the volume of the thorax. By this method the anterior part of the ribs is not hindered in its movements by the soft parts, which in other methods stretch over the projecting posterior end of the rib. This principle, as set forth by Boiffin-Gourdet, runs through both Sauerbrück's and Wilms' 'Columnar Resection.'"

The selection of patients upon whom it is best to perform collapse by means of extrapleural thoracoplasty requires particular skill. While in the main one might say that any patient requiring collapse therapy, upon whom the attempt to produce pneumothorax was unsuccessful, would be eligible to chest wall surgery, there are certain limitations. A great deal depends upon the condition of the opposite lung. While it would seem that a slight infection would not materially interfere with the outcome of the operation, the writer is of the opinion that the surgeon should be very cautious in attacking any thorax where the "better" lung shows very evident infection. Roentgenographic studies of all cases should be made. These will reveal the presence of cavitation and give a better idea of the condition of the pleurae, especially its thickness and adhesions.

### Case Report

Case No. 7907, referred by Drs. Kalb and Kirschner, Monrovia. Miss A. K., age 31, teacher and native of Nebraska, came to California eight years ago. One sister died at 24 years, of phthisis, otherwise family history is negative. Had usual childhood exanthemata, whooping cough at 15, and bronchitis at 29 with recovery.

Has always enjoyed good health except as above. Very fond of outdoor life and indulged in athletics. Began coughing in February, 1918. Temperature range from 99° to 103°. Became suddenly worse in January, 1919. Change in posture was followed by profuse expectoration and rapid rise in temperature to 105°, with chills. Incomplete pneumothorax by Dr. Kalb repeatedly until December, 1919, resulted in general improvement and reduction of highest temperature from 104° to 102°. Patient kept continuously in bed in a sunny, well ventilated room, near the foothills.

Physical examination revealed a very thin, poorly nourished patient weighing about ninety pounds, having lost twenty-seven pounds in one and one-half years. The heart was regular, rapid (104), no murmurs. The arterial blood pressure was 110/75. The respiratory movements were decreased on right side with increased dullness, harsh bronchial breathing and evident cavitation. The blood contained Hemoglobin 60 per cent, Erythrocytes 3,160,000 and Leucocytes 17,350. Clotting time, 5 minutes. Urine contained a doubtful trace of albumen, occasional pus cells, many crystals calcium oxalate, some epithelial casts, otherwise negative. Roentgenogram of chest showed right lung cloudy

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throughout with cavities and many pleural adhesions. Left lung clear except for a few calcified glands at hilus.

On June 8, 1920, operation under local anaesthesia, a parasternal incision was made on right side. Extrapleural resection of parts of first to fifth ribs inclusive, closure of muscles and skin. No drainage. Patient made an uneventful recovery, leaving hospital in two weeks. Her general health gradually improved. Sputum decreased and temperature curve improved. Pressure bandage applied.

On September 2, 1920, she was referred back again by Dr. Kalb for the second stage of operation. The roentgenogram showed considerable collapse of the lung but not sufficient to obliterate the cavities. She was not coughing as much and the temperature had been considerably lower since the first stage of the operation. There was practically no respiratory movement of the right chest and no bony union at points of resection. Being quite apprehensive about the operation, a combination of morphine, procain and gas oxygen anaesthesia was used. A paravertebral incision exposing angles of fifth to eleventh ribs being made, sections varying from two to four inches were removed in each instance, always including the angle, without opening the pleural cavity.

She left the hospital in a week and made a good recovery and, excepting a slight infection of lower end of incision and some neuralgia in shoulder, had no post-operative complications.

In a letter dated November 24, 1920, she says: "My temperature is seldom above 99° these days, sometimes normal all day."

Her recovery has progressed satisfactorily up to the present time and the outlook is good.

#### Summary

1. The extrapleural rib resection under local anaesthesia is a comparatively safe operation.
2. The patient with large cavities and toxic conditions from pus absorption, still has a chance even if artificial pneumothorax has failed.
3. The proper selection of cases for operation is of more importance than anything else and requires careful study.
4. In some instances it is better to divide the operation into more than one stage.
5. Extrapleural resection of the angles of the ribs offers the best means of collapsing the lung.

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## URINARY PUS CELL COUNT \*

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Routine laboratory reports concerning pyuria are often fallacious and the interpretations of them frequently lead to wrong opinions, not only from a viewpoint of diagnosis or prognosis, but in segregating cases that either are or are not worthy of serious study.

In the urine the importance of a small amount of pus originating from the glands or mucus membranes of the lower urinary segment or from the genitalia may be nil, yet upon centrifuging such a specimen many corpuscles will be demonstrated that may wrongly stimulate the notion of severe infection. Such interpretations are further induced because the urine submitted for examination has not been properly collected and inspected.

Gross infections are quite apparent and usually the microscopic search for pus cells is negligible, but the finer infections, such as pyelitis, pyelonephritis, obscure prostatitis and vesiculitis, and the remote urinary infections of children and young adults, are problems the course of which becomes more complicated and result of treatment more uncertain without absolute microscopical control of the actual number of white corpuscles.

A characteristic of renal pyuria is that the exhibition of cells is consistent and constant. Urinary pus may be decreased somewhat by rest, and increased by exercise, cold, and alcohol, but with unusual exception, infection once chronically established is continuous and the variation in intensity of this is slight.

A drop of pus in a centrifuged specimen of 100 mils or ten drops in a like volume will, in a pipetted deposit on a slide, show the same number of cells. The microscopic examination of 1 mil or 10 mils of pus in concentration will furnish such crowded fields that they cannot be told apart. The amount of pus produced by a urethral shred collected by pipette from the bottom of a centrifuge tube will, by comparison, show as many cells under a cover glass as a like quantity of pure pus similarly obtained.

Because of the consistent quality of a given specimen of urine 1 c.mm. taken from 10 mils or 100 mils will give the same number of cells.

Until recently we have been counting a definite number of fields and making our estimate on the average number of cells per field in uncentrifuged specimen. This is not a precise method, as cover glass pressure and fluid dispersion cannot be controlled.

Therefore, as a means of more or less accurate diagnostic and prognostic aid, the following method has been adopted. The technique is both rapid and simple, and the count is made without centrifuging.

The fresh specimen of urine is thoroughly shaken and a portion drawn into a red blood cell pipette. This pipette is chosen because it facilitates a final agitation of the fluid. A Thoma Zeiss counting chamber is then filled with the fluid in the method used for counting blood cells. The eyepiece of

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